UCM-316

User's Manual

1.0

Document history

Date	Version	Author	Remarks
23/10/2015	1.0	Sara Prior	User's Manual including new features such as Analog inputs and FTP client configuration

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1 Introduction

This Manual will show you how to configure the UCM-316 datalogger/controller by using the UCM-316 configurator software.

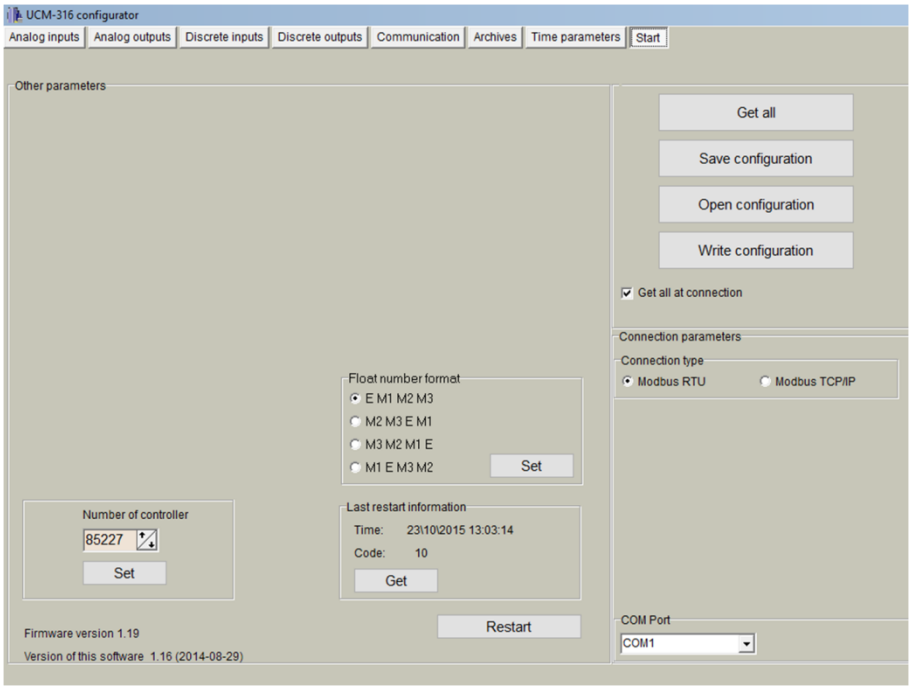


Figure 1. UCM-316 Configurator

2 Setting up connection to the device

In order to configure the controller, user must connect its PC to the device by using any of the following interfaces:

1. USB port
2. ETHERNET interface
3. Through a GPRS connection (only accessible after configuring GPRS APN, user and password inside the controller)

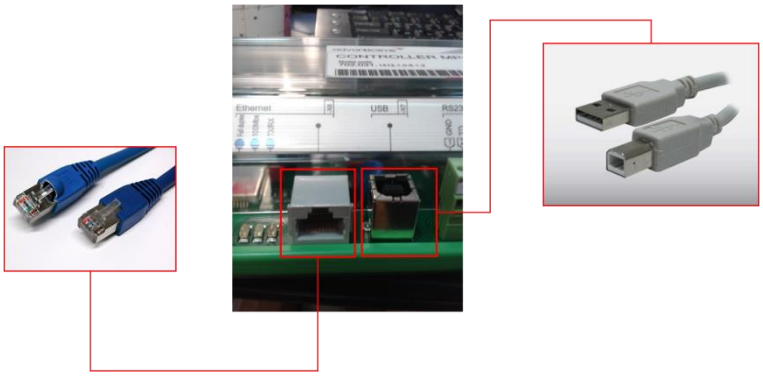


Figure 2.UCM-316 connection interfaces

NOTE: Not all the models support above interfaces. Check your ordering code first.

2.1 USB connection

Steps to be followed:

- Connect an USB cable class B to the correspondent port
- Open UCM-136 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus RTU" option under "Connection type"
    - Configure “Bode” and “Parity” parameters; default values are:"19200" , "none"
    - Select COM port number assigned by your PC to the USB port
    - Click on “**Get all**” to establish connection with controller.

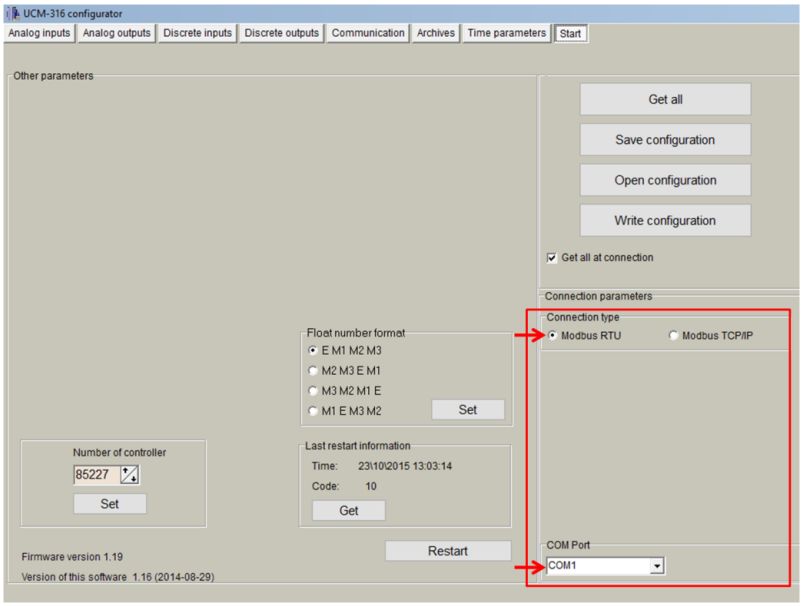


Figure 3. USB connection set up

2.2 ETHERNET Connection

Steps to be followed:

- Connect a RJ45 Ethernet cable to the correspondent port.
- Open UCM-316 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus TCP/IP" option under "Connection type"
    - Add controller IP address and TCP port in "Host or IP" and “Port” text boxes, respectively
    - Select “Ethernet” option under “Connection through”
    - Click on “**Connect**” to establish connection with controller.

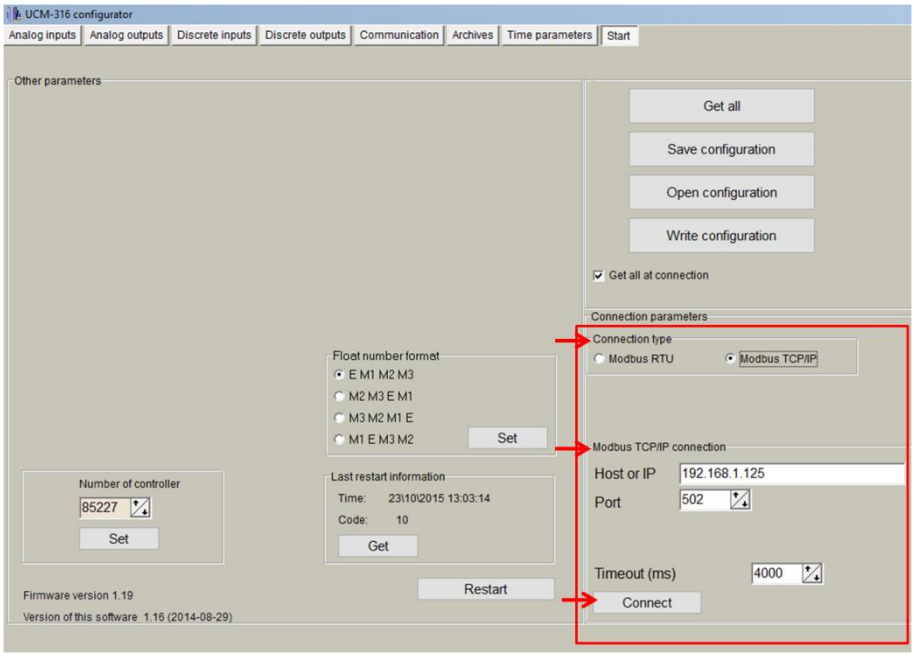


Figure 4. Ethernet connection set up

2.3 GPRS Connection

Steps to be followed:
- Check GPRS antenna is properly connected to the device.

Figure 5. GPRS antenna connection

- Open UCM-316 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus TCP/IP" option under "Connection type"
    - Add controller IP address and TCP port in "Host or IP" and “Port” text boxes, respectively
    - Click on “**Connect**” to establish connection with controller.

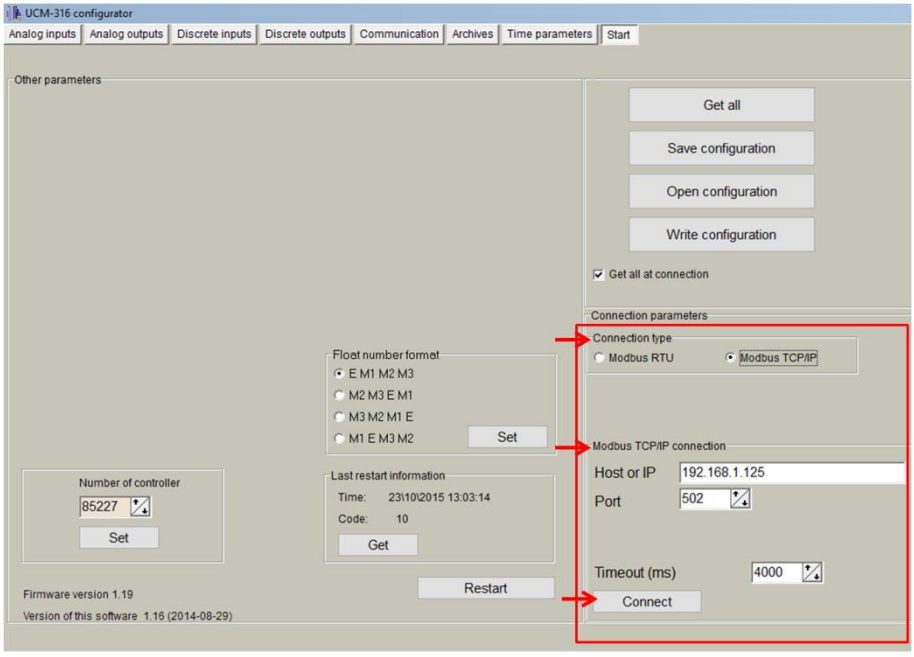


Figure 6. GPRS connection set up

2.4 UCM-316 connection diagrams

In the following Figure, the most typical connection schemes of UCM-316 with PC are shown. The Configuration Tool described in this document or any other Modbus complaint software can establish a communication link making use of **Modbus RTU** and/or **Modbus TCP** protocols.

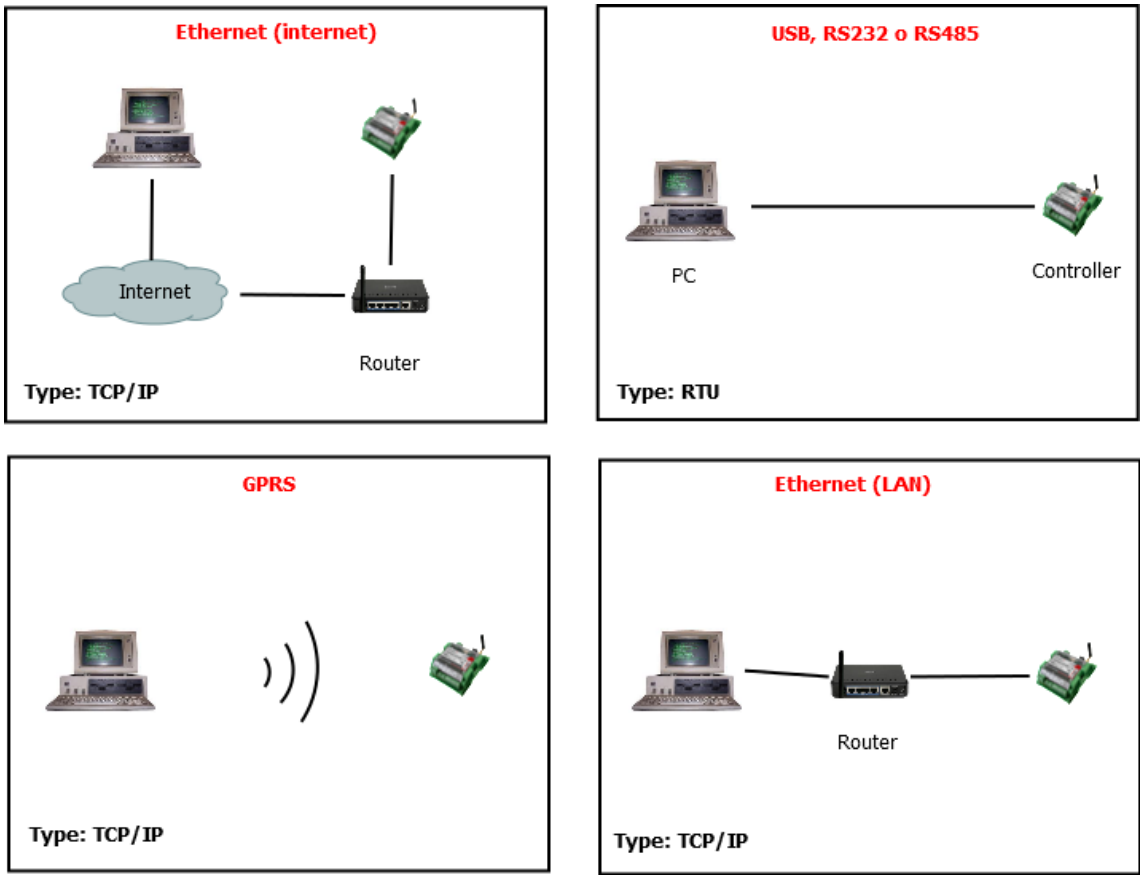


Figure 7. UCM-316 typical connection diagrams

3 “Start” tab

3.1 UCM-316 Basic Information

Once user has established communication with UCM-316, basic information such as "*User identificator*" , "*Serial number*", "*Last restart*", "*Firmware version*", "*Software version*", etc. is shown in the left frame

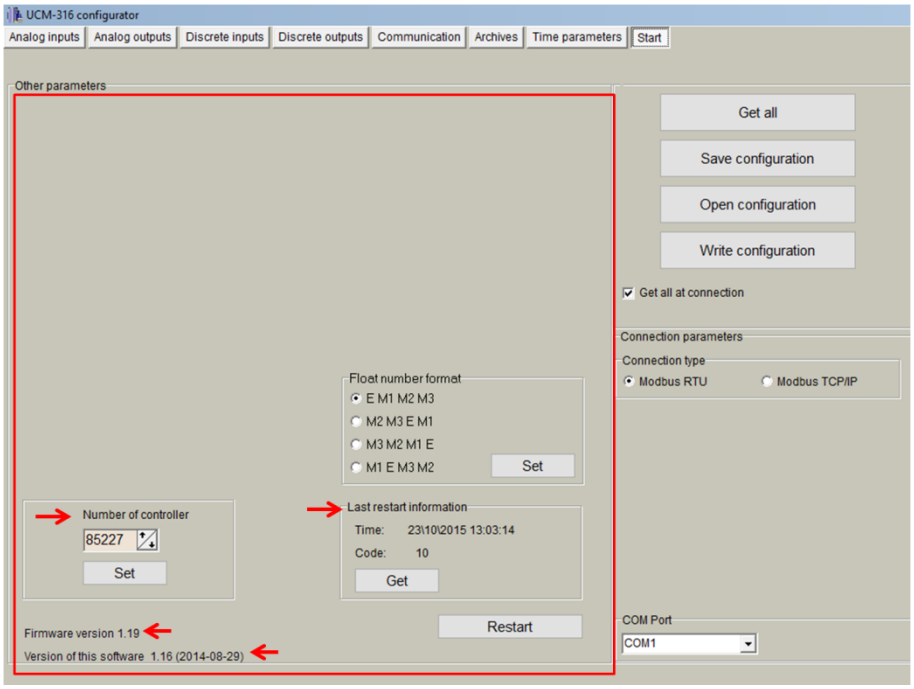


Figure 8. “Start” tab. UCM-316 basic information

3.2 Configuration files

This feature enables user to save and load configuration files so that programming a number of controllers with the same configuration becomes an easy process. Steps to be followed are:

1. Set up all the configuration parameters making use of UCM-316 Configuration Tool.
2. Then, under “Start” tab, click on **"Save configuration"** button. A dialog will be shown requesting user to select folder destination.
3. Once the file has been stored, connect a new controller to the PC and then click on **"Open configuration"** and select the file previously stored.
4. Then, click on **"Write configuration"** button to load such configuration into the new controller.
5. A restart will be needed so that controller can start using the loaded configuration.
6. Repeat from step 3 with all the controllers that need the same configuration.

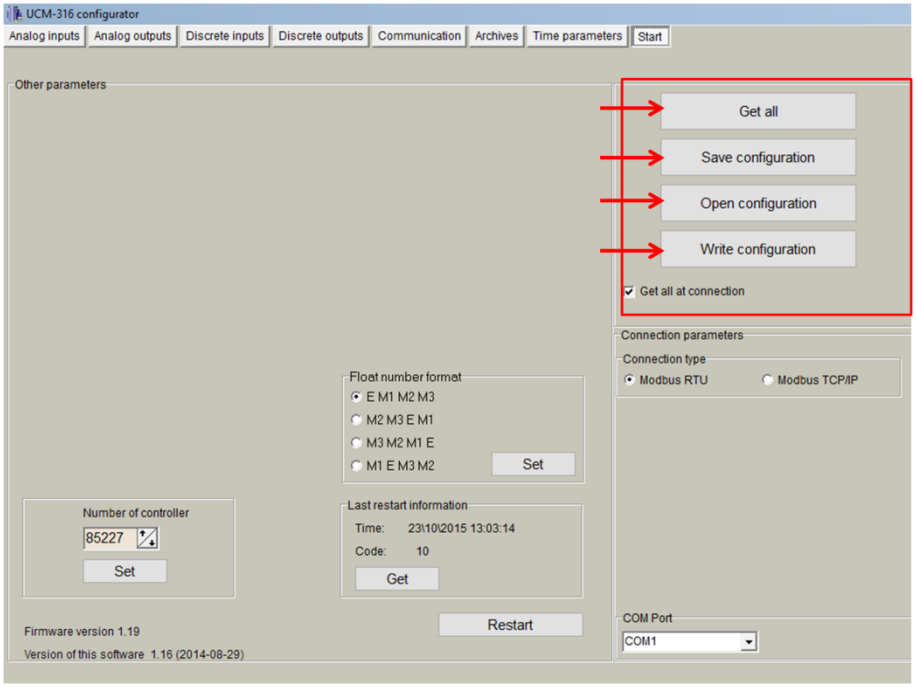


Figure 9. “Start” tab. Configuration files management

3.3 Status indicators

Several status indicators are shown in the UCM-316 configuration tool in order to inform user about current performance of Modbus communication:

1. Req: number of Modbus requests performed.
2. Answ: Number of Modbus answers received.
3. Tout: number of Modbus requests not answered (time outs raised).
4. Except: number of Modbus errors.

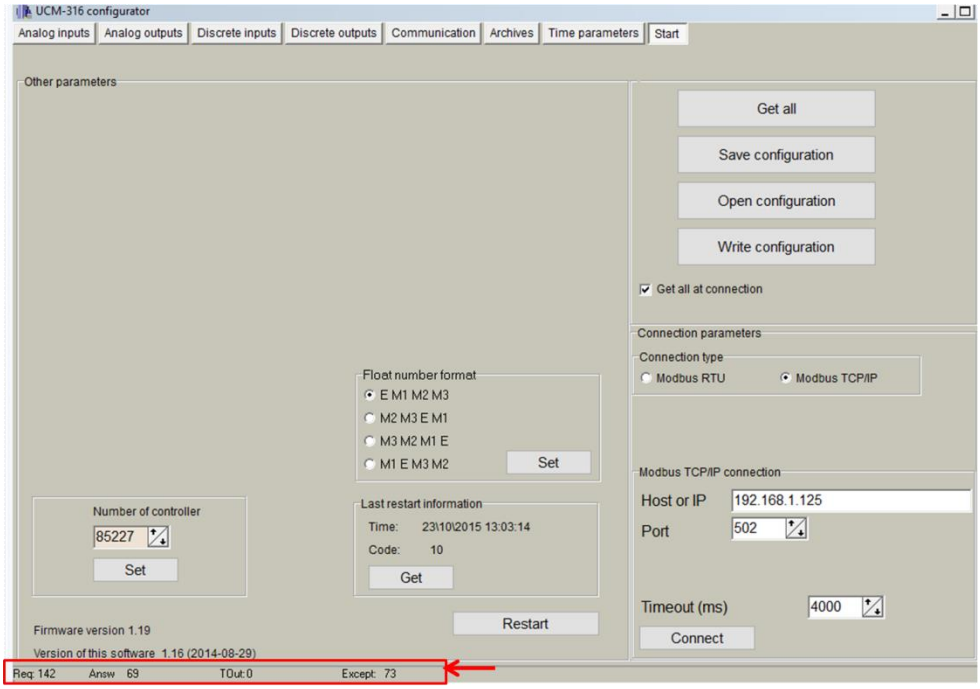


Figure 10. "Start" tab. Status indicators

4 “Analog Inputs” tab

The UCM-316 has 6 analog inputs:

- Ain1-Ain3 - Voltage inputs (0-5VDC / 0-10 VDC)
- Ain4-Ain6 - Current inputs (0-5mA /0-20mA / 4-20mA)

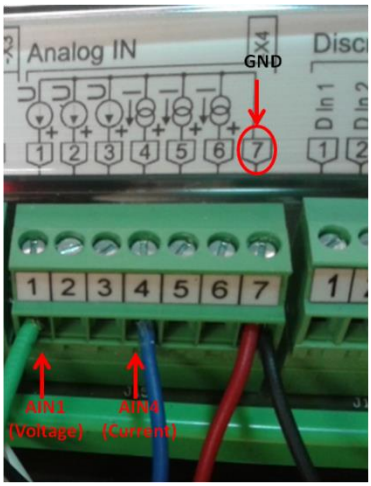


Figure 11. Analog inputs connection

Go to *Analog inputs>Configuration*:

- Enable the analog input.
- Range: Select the sensor output range
- "MIN. value" / "MAX value" : Defines the sensor operation range
- "Low alarm limit" y "High alarm limit": In case of Alarms defined it configures the performance limits
- "Current value" is the current value read by the sensor and converted according the configured operation range.

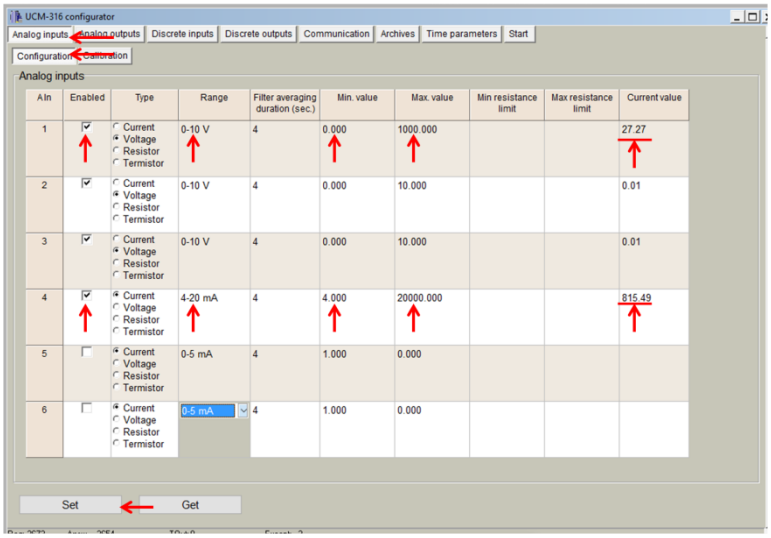


Figure 12. Analog inputs configuration

Apart from checking the correct Analog inputs performance by using the "current values" column of the UCM-316 Config. tool, it is possible to read directly the corresponding modbus registers by using a Modbus function "3":

	Modbus Register list					
Description	AI_1	AI_2	AI_3	AI_4	Data format	Type
Analog input use (0- disabled, 1 – enabled)	4524	4525	4526	4527	Char	R/W
Measuring type (0-voltage, 1-current, 2-resistance)	4528	4529	4530	4531	Char	R/W
Min recalculated value Float[4]	4600-4601	4602-4603	4604-4605	4606-4607	Float	R/W
Max recalculated value Float[4]	4608-4609	4610-4611	4612-4613	4614-4615	Float	R/W
Physical value (Float[4])	4504-4505	4506-4507	4508-4509	4510-4511	Float	R
Recalculated value (Float[4])	4512-4513	4514-4515	4516-4517	4518-4519	Float	R

Figure 13. Analog inputs UCM-316's Register list.

The "Physical Values" and "Recalculated Values" registers are real time registers. The values are updated each 1 second.

5 “Analog Outputs” tab

The UCM-316 presents 2-Channel Analog Output terminals which generate signals in the range between 0 to 10 VDC. Both can be used as Dimmer signals.

Figure 14. Analog outputs connection

In order to configure their values go to *Analog Output > Configuration.*
In order to configure the value of the analog output just move the slide bars to the desired value.

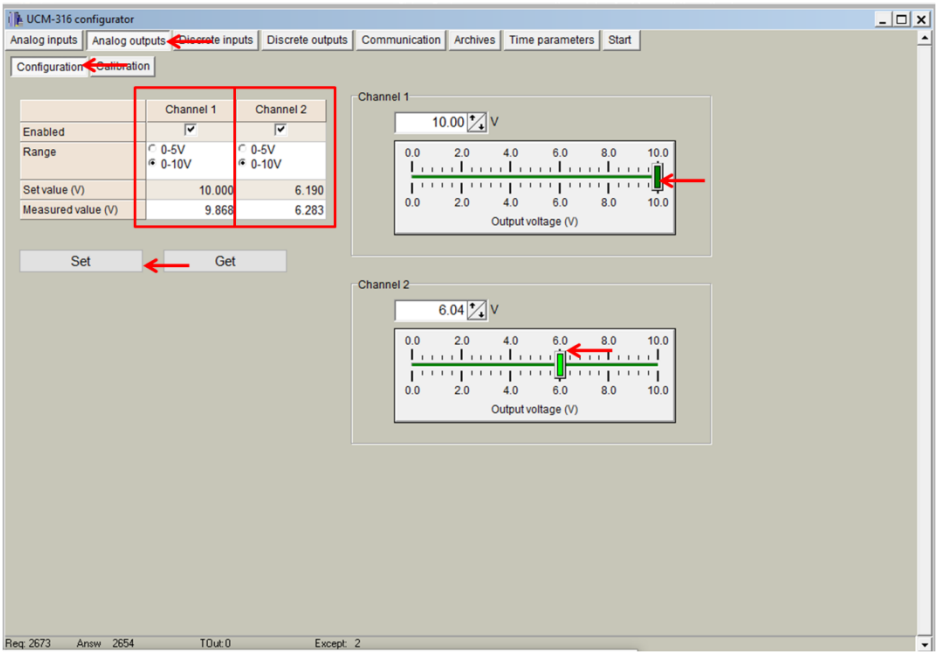


Figure 15. Analog output configuration

	Modbus Register list			
Description	AO_1	AO_2	Data format	Type
DAC code (0..1000) [2]	4360	4361	Int16	R/W
Voltage of Analog OUTPUTS (0..10) V [2]	4362-4363	4364-4365	Float	R/W
Usage of Analog OUTPU (0 - disabled, 1- Enabled) [2]	4366	4367	Char	R/W
Voltage range (0 - 0..5V, 1 - 0..10V) [2]	4368	4368	Char	R/W
Voltage rate A [2]	4370-4371	4372-4373	Float	R/W
Voltage rate B [2]	4374-4375	4376-4377	Float	R/W
Constant of voltage measuring filter (1..8sec) [2]	4378	4379	Char	R/W
Rate of voltage measuring A [2]	4380-4381	4382-4383	Float	R/W
Rate of voltage measuring B [2]	4384-4385	4386-4387	Float	R/W

Figure 16. Analog Outputs UCM-316's Register list

6 “Discrete Outputs” tab

The UCM-316 has two discrete relay outputs that can perform in 2 different working modes:

- Manually. It is possible to enable/disable the relay status by using the controls that appear in *Discrete outputs>Configuration* .

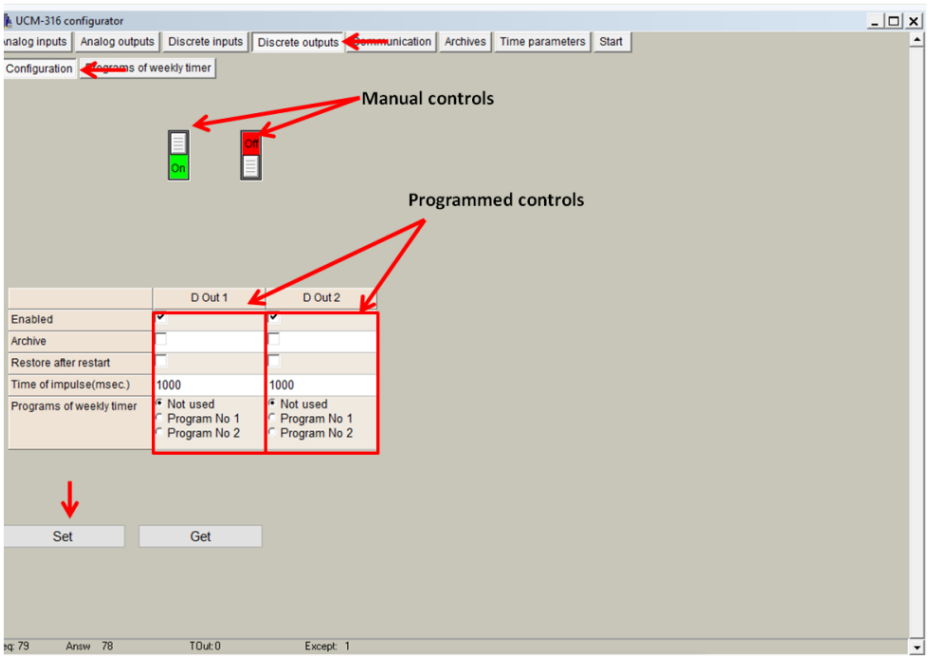


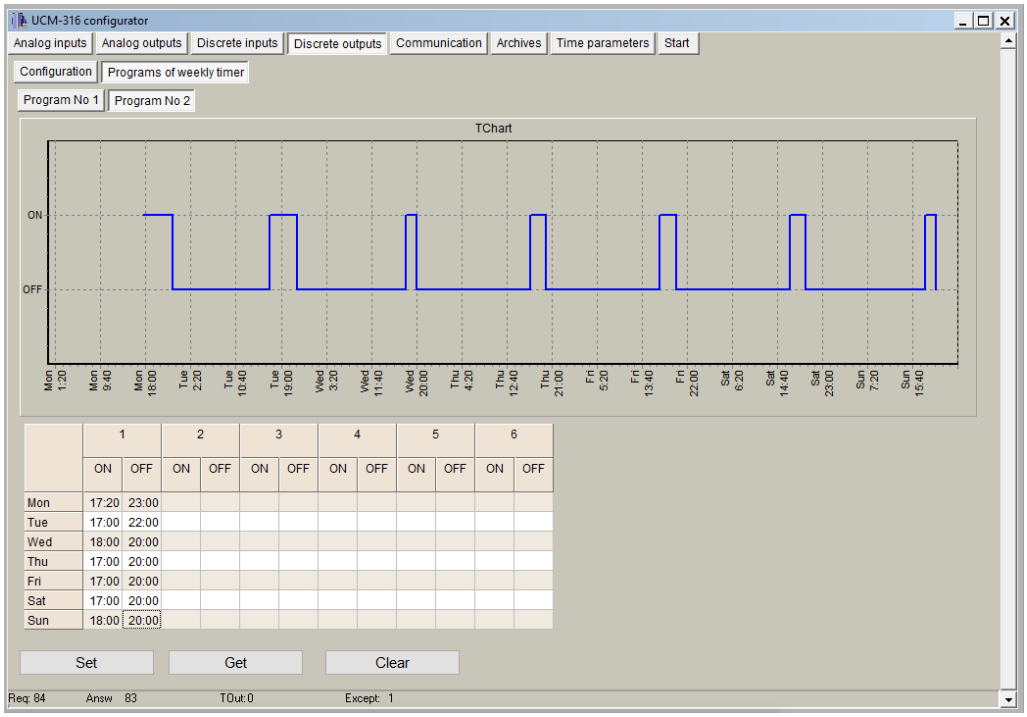
Figure 17. Discrete Outputs Configuration

Also it is possible to manage the state of the relays by using the UCM-316's register list with Modbus function '3' for reading or '16 for writing:

	Modbus Register list			
Description	DO_1	DO_2	Data format	Type
Discrete output usage. (0- channel not use, 1 – channel use)	4300	4301	Char	R/W
Discrete output state change archive (0 – not store, 1 – store)	4302	4303	Char	R/W
Discrete output restore (0 - don’t restore values after reset, 1 – restore values after reset)	4304	4305	Char	R/W
Timeouts of Discrete outputs in Impulse mode (100-20000 ms)	4306	4307	Int16	R/W
Discrete output state (0 - Output off, 1 – Output on)	4350	4351	Char	R/W
Status of Discrete output in Impulse mode (0 - disabled, 1- enabmed)	4352	4353	Char	R/W

Figure18. Discrete Outputs UCM-316's Register list

- Programmed: It is possible to program 2 different working calendars to the discrete outputs in *Discrete outputs> programs of weekly timer* and load them to the different discrete outputs:



	1		2		3		4		5		6	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Mon	17:20	23:00										
Tue	17:00	22:00										
Wed	18:00	20:00										
Thu	17:00	20:00										
Fri	17:00	20:00										
Sat	17:00	20:00										
Sun	18:00	20:00										

Figure 18. “Discrete outputs” programmer

7 “Discrete inputs” tab

Discrete inputs can be configured within this tab. They are shown organized in columns and configuration parameters are shown in rows as follows:

- "Enabled": user enable/disable discrete inputs to be used. In order to save memory, it is recommend to only enable inputs in use.
- "Current State": Graphical representation of current status (open/closed).
- "Debounce time": only pulses received within one or more “Debounce time” intervals are registered.
- "Mode":
  - "Discrete Input": input works as a standard discrete input detecting its current state (1 / 0)
  - “Alarm signal”: input is used as an alarm input.
- "Alarm state": If "Alarm signal" option is selected, controller will raised an alarm when one of the following state is reached: "Open", "Close", "Both cases".
- "Enable archiving": If enabled, events produced by discrete inputs are stored in the datalogging archive.
- "State to archive": selects the discrete input state to be stored

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

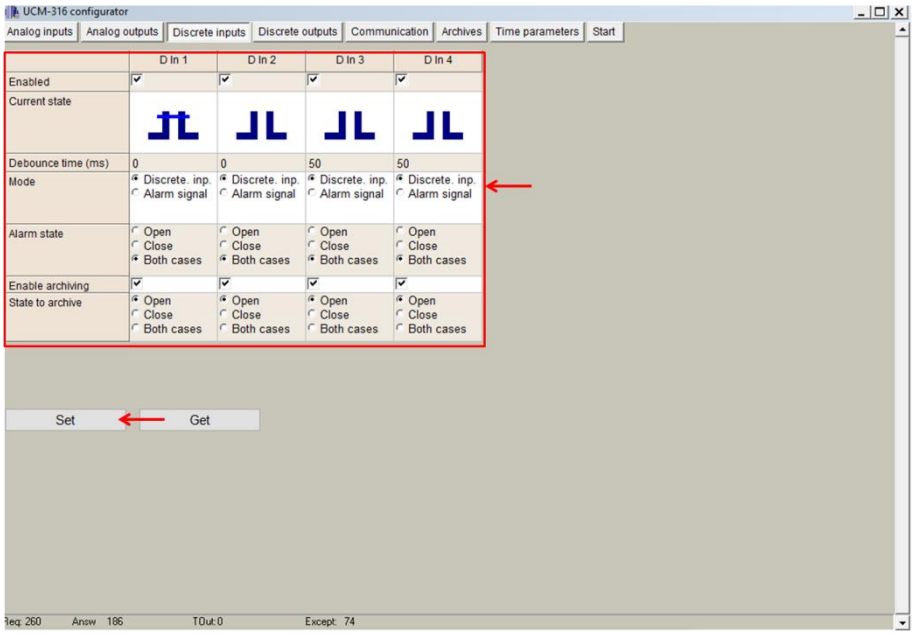


Figure 19. “Discrete inputs” tab

8 “Communication” tab

8.1 Communication > Ethernet

Ethernet interface parameters can be configured within this tab:

- "MAC number": Media Access Control address
- "IP address"
- "Gateway IP"
- "Mask"

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

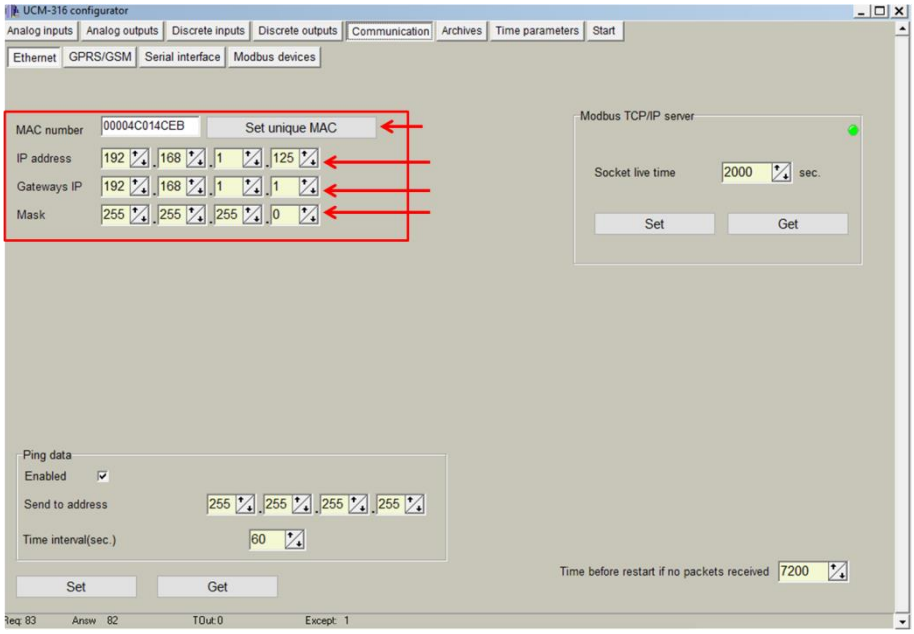


Figure 20. “Ethernet” configuration tab

8.2 Communication > GPRS

As previously described, UCM-316 can be configured through a GPRS link. In order to do so, user must enable GPRS connection as shown below. Then, click on "**Set**" button in order to save changes.

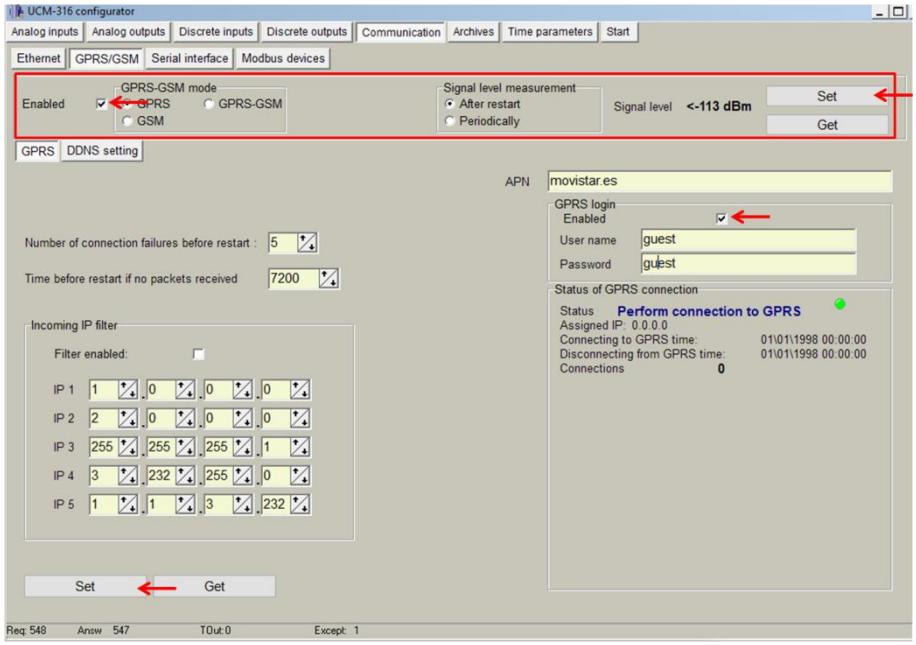


Figure 21. "GPRS" Tab. Enabling communication

Within this tab, different services can be configured or checked.

1. GPRS connection parameters:
   - "APN": access point name provided by Internet Service Provider (ISP).

   If needed by ISP, credentials can also be configured here:
   - "Username": provided by ISP.
   - "Password": provided by ISP.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

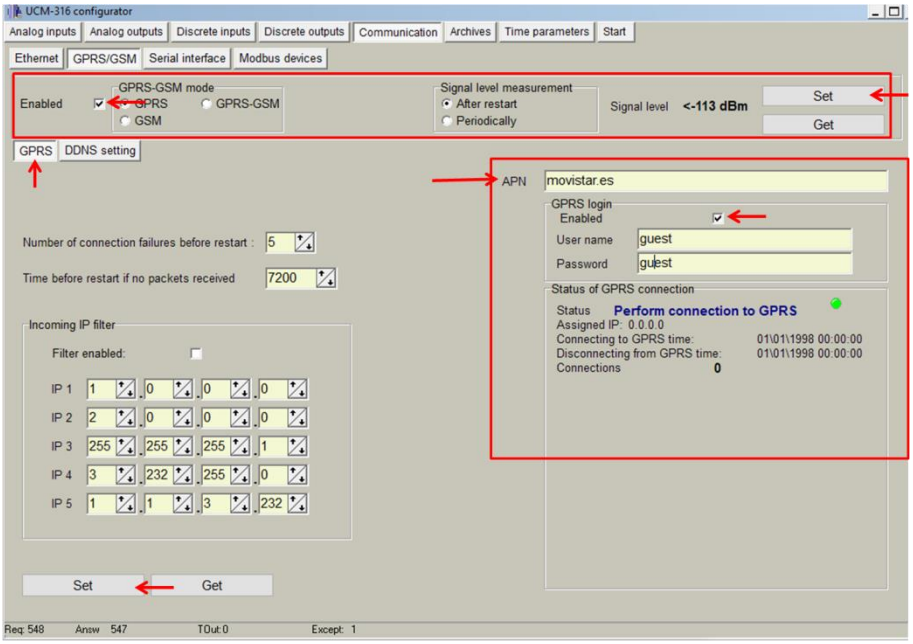


Figure 22. "GPRS" tab. Internet Service Provider access data configuration

2. Connection status. Once GPRS connection is established, status will be shown as below:

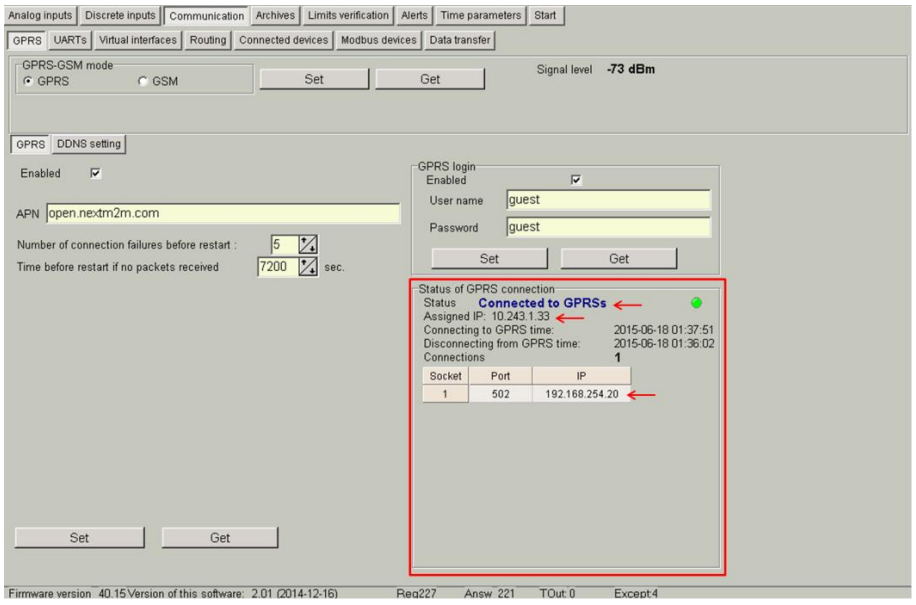


Figure 23. "GPRS" tab. Connection status

3. DynDNS account configuration (Not supported by all models): in order to avoid the need to have a fixed IP address to be able to remotely access the device, it is possible to set up a DynDNS account under the "DDNS setting". Steps to be followed are:
   - Select “Enable”
   - Fill in information according to your DynDNS account
   - Click on "Load from file" and select "dyndns.org_Register_String.txt " which contains the connection string to be sent to DynDNS servers.

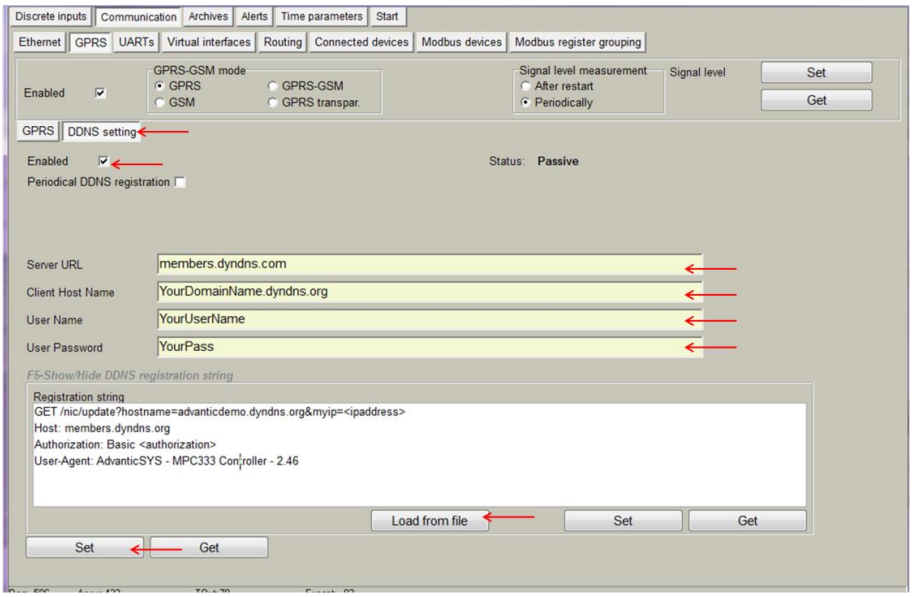


Figure 24. “GPRS” tab. DynDNS configuration

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.
NOTE: It is recommended to disable GPRS connection if not used.

8.3 Communication > Serial Interface

The UART1 is in charge of managing the serial communication. This UART can be configured by using the UCM-316 Config. tool.
NOTE: All devices connected to the UART1 in UCM-316 must have the same communication parameters.

- "Bode": Transmission rate (bauds per second).
- "Parity": Communication Parity.
- "Data bits": Number of data bits within the communication packet.
- "Stop bits": Number of stop bits within the communication packet.
- "Packetization":
  - "time": One packet time has been reached, it is considered that the packet has been properly sent.
  - "Symbol". Every time a "packet symbol" is received, it is considered that the packet has been properly sent.
  - “Length”. Once the "packet byte count" has been reached, it is considered that the packet has been properly sent.
- “Packet time”: Transmission duration.
- “Packet symbol”: Symbol which defines packet ending.
- “Packet byte count”: Length which defines packet size
- “Mode”: Full duplex or half duplex
- “Destination of DTR”: bit which defines the "Data ready" state has been reached. It must be configured following peripheral devices connected to UCM-316 UARTs vendor information. By default, if this information is not available, it is recommended to select "OFF when send" option.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

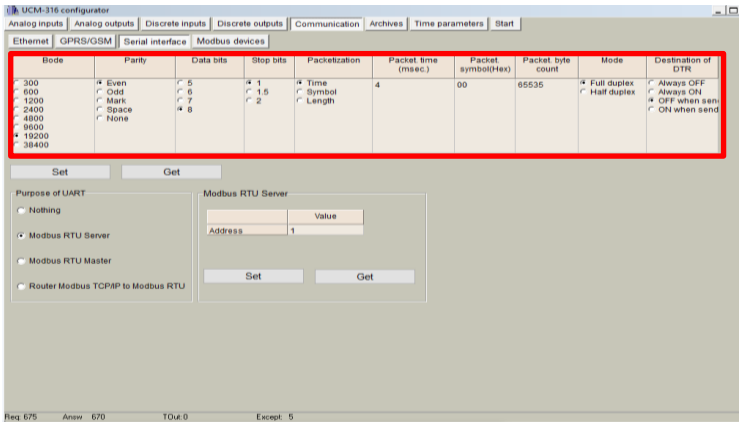


Figure 25. “UARTs” Configuration Menu

The UCM-316 can perform as communication gateway Modbus server/client and datalogger simultaneously. In order to set up these options, different **virtual interfaces** are needed as shown below:

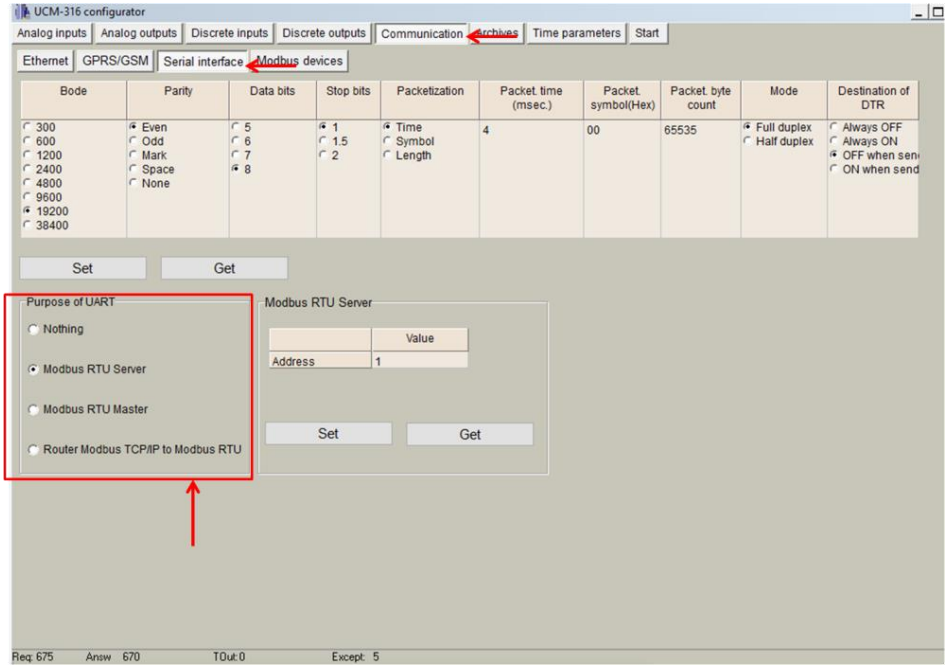


Figure 26. Virtual interfaces Menu.

8.3.1 Nothing

This mode disables UART 1

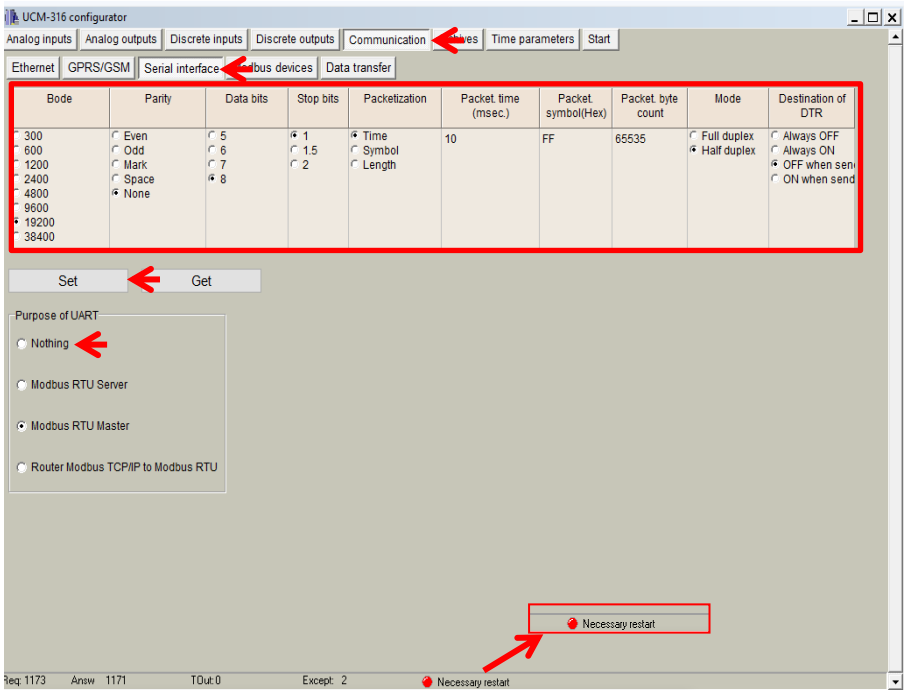


Figure 27. Virtual interfaces. Disabled

8.3.2 Modbus RTU Server

This mode is used when the UCM-316 is used as Modbus slave in a network. Requests from a Modbus server will be received and answered.

- "Enable": Do not enable any Modbus RTU server if not needed.
- "Address": Define Modbus address for UCM-316. Modbus master must send requests to the given address.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

Once the address is added press "SET" to update the changes and restart the controller.

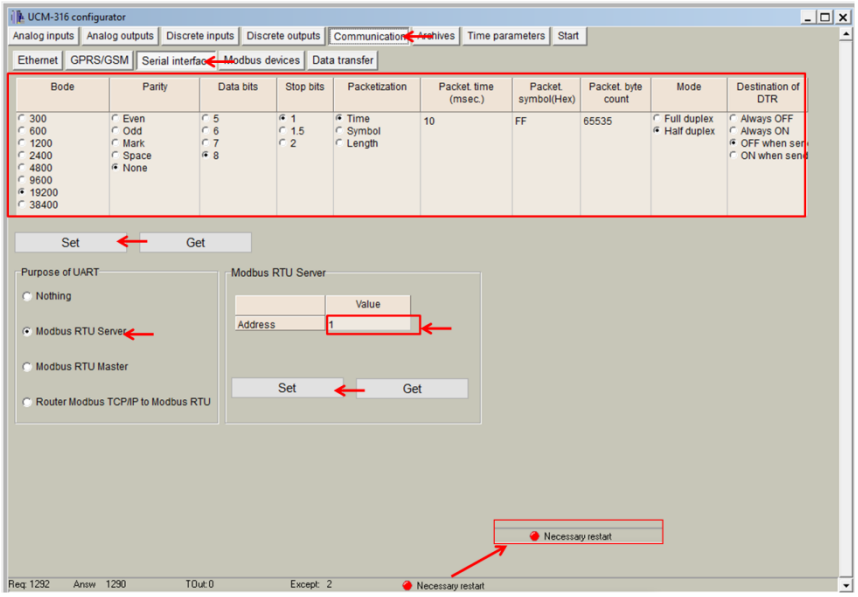


Figure 28. Virtual interfaces. Modbus RTU server

8.3.3 Modbus RTU Master

This working mode must be used when the UCM-316 behaves as master in a Modbus RTU network (it sends Modbus requests to the slaves connected to the Modbus RTU network).

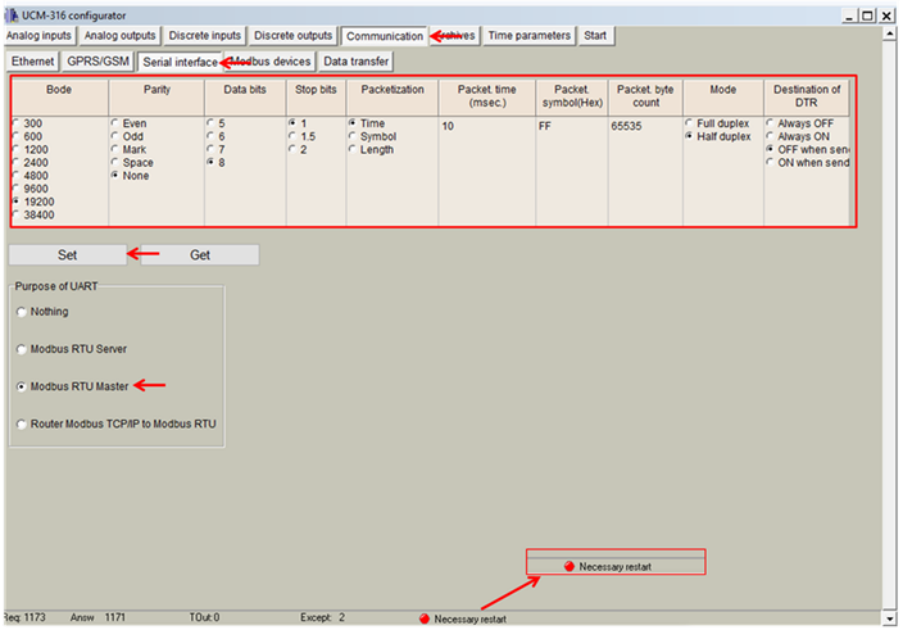


Figure 29. Virtual interfaces. Modbus RTU server

- These requests will be defined under the "Modbus devices" tab. (See 5.4 communication > modbus devices)

8.3.4 Router Modbus TCP to Modbus RTU

The UCM-316 can also forward Modbus packets from a TCP port to a Modbus RTU client. In order to do so, Modbus TCP/IP server mode must be always enabled as shown in the figure. When the device initiating communication sends a request command to the slave device, communication will be shut down when this time is reached.
This routing mode can be done in two ways:

- Destination "TCP port": This mode enables assignment of a TCP port to each Modbus RTU device as previously configured under Communication>Virtual interfaces>Modbus RTU Client tab.

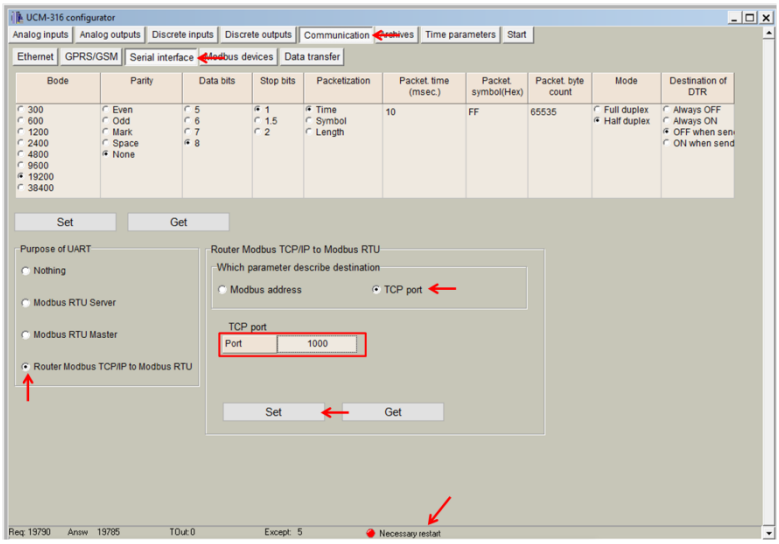


Figure 30. Virtual interfaces. Modbus TCP to Modbus RTU

- Destination "Modbus address": Within this mode, user can identify Modbus addresses to each Modbus RTU device as previously configured under Communication>Virtual interfaces>Modbus RTU Client tab. With this configuration, Modbus commands can be sent to devices within the network making use of the specific device Modbus address and the UCM-316 IP address and TCP port 502.

NOTE: After configuration is completed, click on "Set" button in order to save changes.

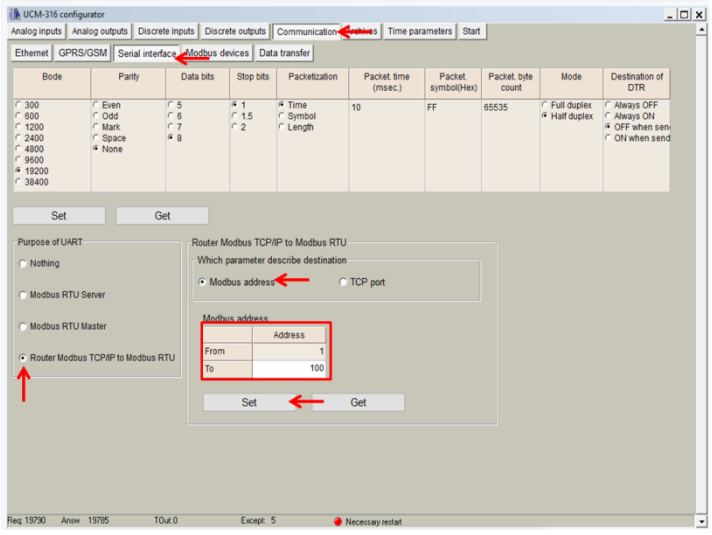


Figure 31. Virtual interfaces. Modbus TCP to Modbus RTU

8.4 Communication > Modbus devices

The UCM-316 can read up to 100 Modbus RTU devices through UART3 as shown in the following figure.

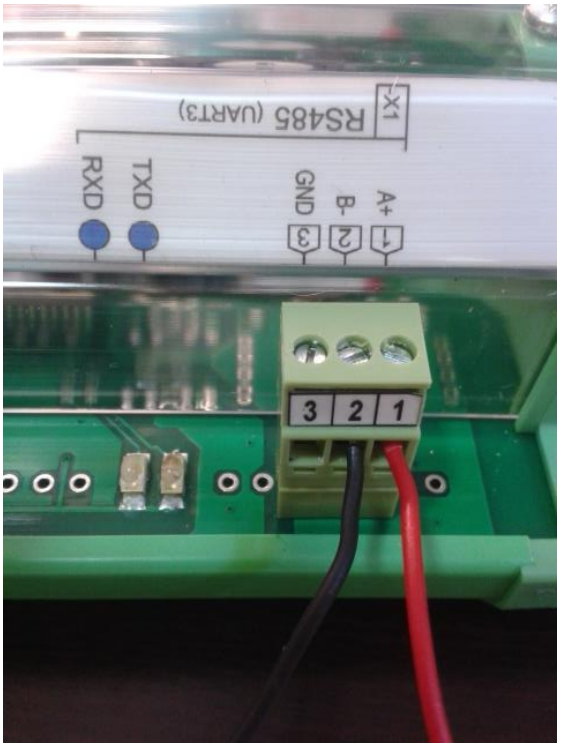


Figure 32 Connecting Modbus RTU devices to the UCM-316

In order to configure Modbus RTU client list, follow the next steps:

- Go to *Communication> Modbus Devices.*
- Once the virtual interface has been enabled under Modbus RTU client-UART x, the list of requests for the Modbus client must be configured. For this purpose it must be configured as much lines as Modbus requests required. The number of requests can be configured in "Amount of requests", where:
  - "Address": Slave device Modbus Address.
  - "Function": Modbus RTU function.
  - "Registers/coils ":Register/s address to be requested.
  - "Amount of registers/coils": number of registers to be read from the register address configured in “Register/coils”
  - MPC- Reg. index: Internal UCM-316’s RAM memory index where data is recorded. In case of UCM-316 it starts in the address 52000 (index =0 => RAM Modbus address=52000@DEC).
  - Priority: It configures the request management priority.

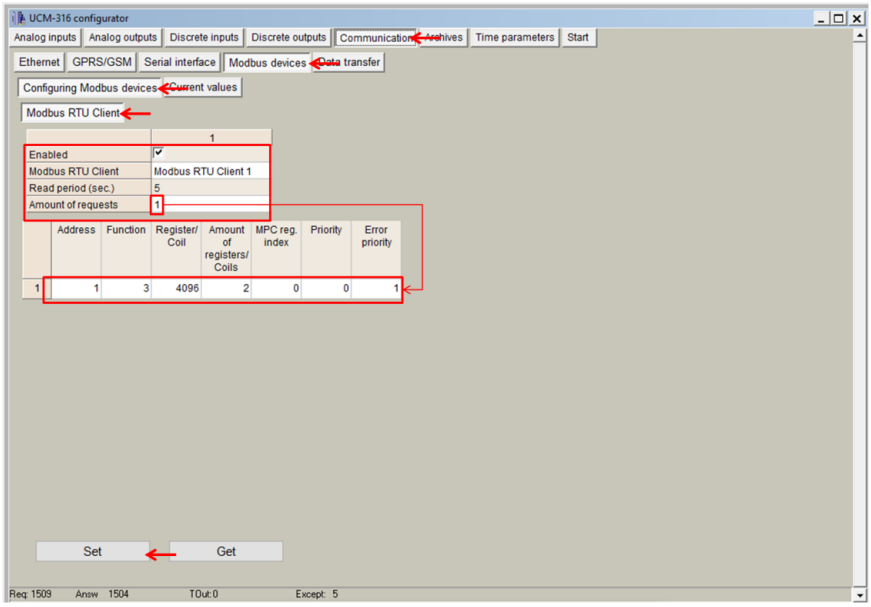


Figure 33. "Modbus devices" tab. Modbus RTU client parameters list configuration

NOTE: Maximum number of requests per each Modbus RTU Client is 50

NOTE: There exist 2 Modbus RTU clients. In case that both must work together 2 different UARTs must be used, one per each Modbus RTU client.

In "Current values" window it is possible to check the received information through the Modbus RTU client. With this screen it is possible to check the correct performance of Modbus devices.

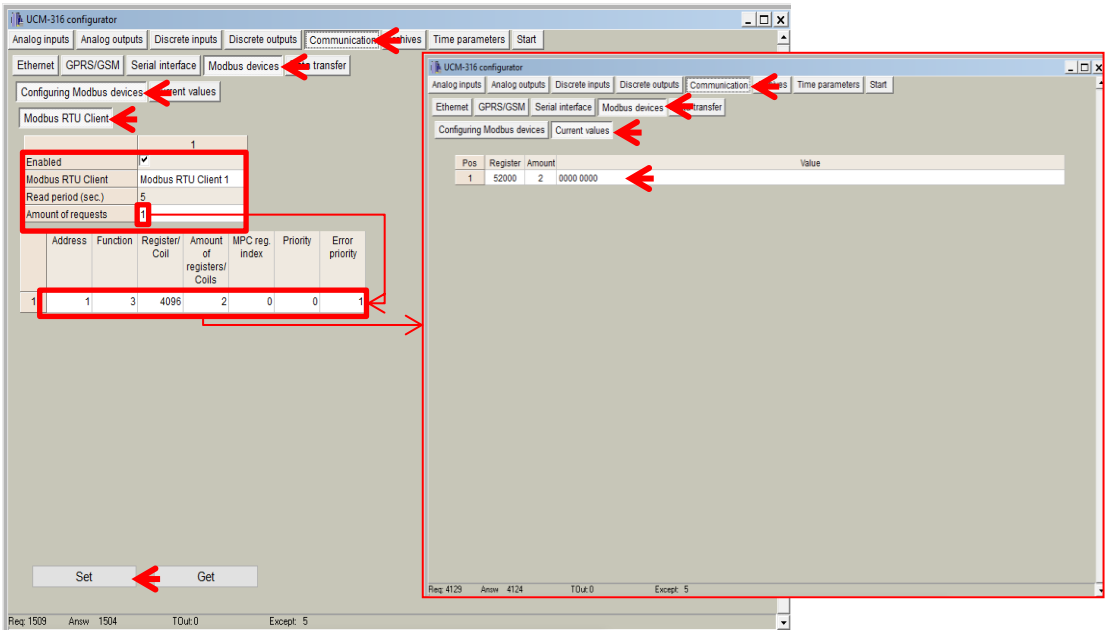


Figure 34. "Modbus devices" tab. Current values

9 "Archives" tab

The UCM-316 has an internal 8MB flash memory. In case, the device is used as datalogger, the following steps must be done:

- Go to *Archives> Configuration*
- In "Storage parameters" frame, configure the following:
  - *"Period":* It defines storage interval. Internal memory is organized in different blocks depending on the devices nature which are connected to the UCM-316.

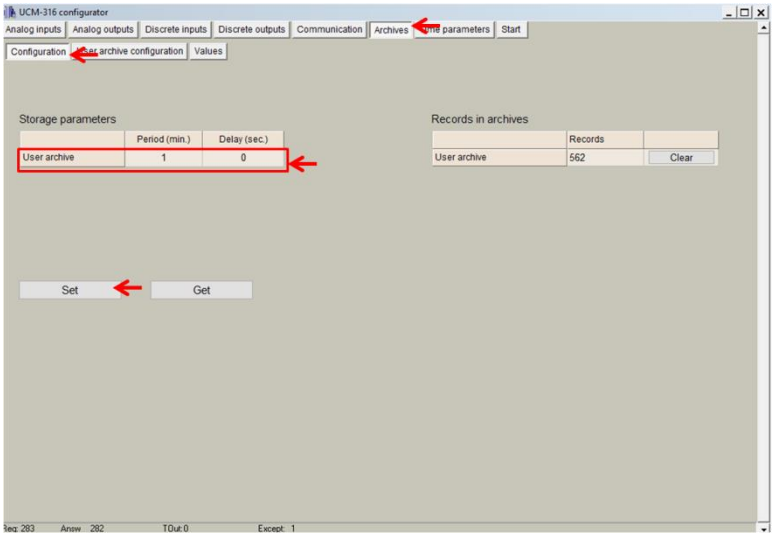


Figure 35. "Archives" tab. Storage frequency configuration

  - In case user needs to customize storage blocks, signals acquisition must be configured accordingly. Memory block used will be defined as "User Archive" (see next step).
- Go to *Archives>User Archive Configuration*
- Under this tab, user can configure datalogging following his own requirements. In the next pages, a configuration example is given by setting the following parameters:
  - *"Count of parameters"*: number of registers to be stored.
  - *"Register"*: Specific register to be stored.

NOTE: Timestamp is registered automatically.

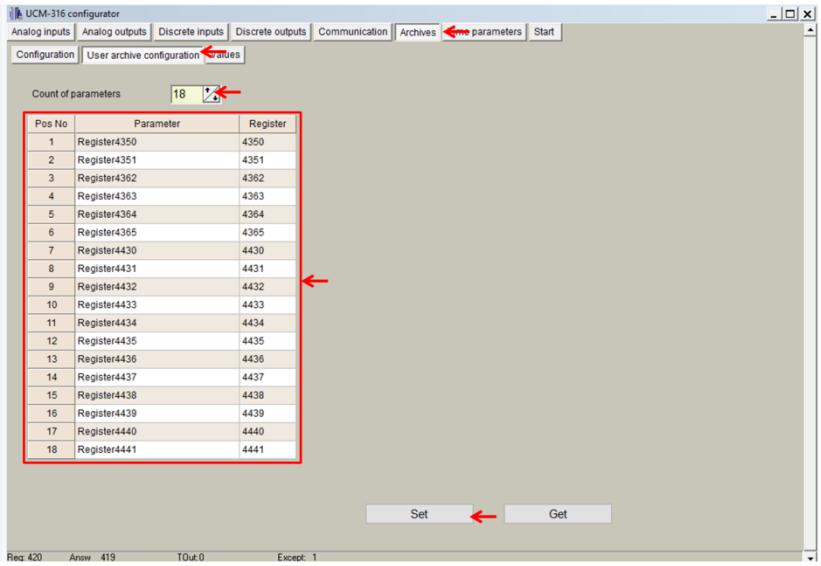


Figure 36. "Archives" tab. User archive configuration

In order to check current data logged in the internal memory, go to *Archives* > *Values* > *User archive* tab. This is only a test feature in order to ensure datalogging is performing correctly.

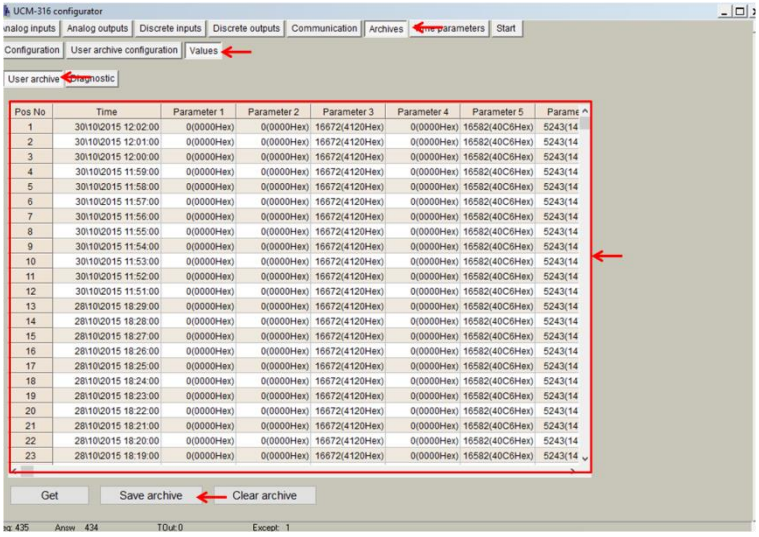


Figure 37. "Archives" tab. User archive current values

NOTE: Internal datalogging memory is organized as a file system accessible through the use of standard Modbus function 20 "File register".

10 "Time parameters" tab

This tab enables users to set up time synchronization between UCM-316 Real Time Clock (RTC) and external time references. Several parameters can be configured under this tab:

- *"Set PC time"* It synchronizes internal RTC with PC time.

Figure 38. "Time Parameters" tab. Set PC time

- *"Clock synchronization":* It must be enabled if synchronization between UCM-316 and any Network Time Protocol (NTP) server is requested. This option is particularly accurate since, every given period (*"Synchronization period"* parameter), device connects to an NTP server to get current UTC time. Also automatic summertime is adjusted.

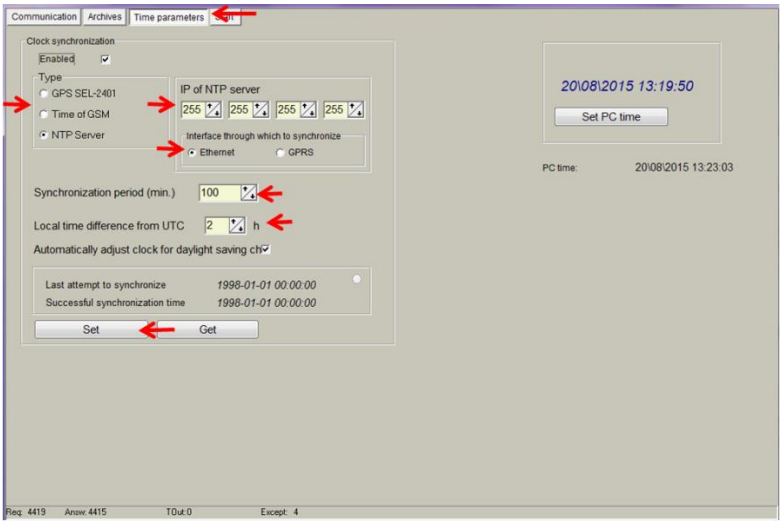


Figure 39. "Time Parameters" tab. NTP server configuration